

Notice of Allowability

Application No.

10/671,633

Applicant(s)

NAKAI ET AL.

Examiner

DUC Q. DINH

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to phone interview on May 23, 2002.
2. ☒ The allowed claim(s) is/are 2-5, 7-9, 12, 14-17, 19-21, 23 and renumbered as 1-16.
3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☒ All b) ☐ Some* c) ☐ None of the:
 1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☒ Interview Summary (PTO-413),
Paper No./Mail Date _____
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____



EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Kevin Kunzendorf on May 17, 2007.

The application has been amended as follows:

Amendments to specification

Replace the first paragraph on page 6 with the following amended paragraph:

In Fig. 2, which is a block circuit diagram of a first driving apparatus for driving the LCD units ~~404~~ 105 and ~~405~~ 107 of Figs. 1A, 1B, 1C and 1D, the main LCD unit ~~404~~105 is of a high quality thin film transistor (TFT)-type having 144×176 pixels which is expensive, and the sub LCD unit ~~405~~ 107 is a low quality super twisted nematic (STN)-type LCD unit having 64×96 pixels which is inexpensive. The main LCD unit ~~404~~ 105 is driven by a data driver circuit 201 and a scan driver circuit 202, while the sub LCD unit ~~402~~ 107 is driven by a column driver circuit 203 and a row driver circuit 204. The data driver circuit 201, the scan driver circuit 202, the column driver circuit 203 and the row driver circuit 204 are controlled by a display control circuit 205 which is also controlled by a central processing unit (CPU) 206. The display control circuit 205 controls a power supply control circuit 207 which supplies power supply voltages to a common electrode CE1 of the main LCD unit ~~404~~105, a common electrode CE2 of the sub LCD

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unit ~~102~~ 107, the data driver circuit 201, the scan driver circuit 202, the column driver circuit 203 and the row driver circuit 204.

Replace the fourth paragraph bridging pages 6-7 with the following amended paragraph:

In Fig. 3, which is a block circuit diagram of a second driving apparatus for driving the LCD units 105 and 107 of Figs. 1A, 1B, 1C and 1D, the main LCD unit ~~104~~ 105 and the sub LCD unit ~~105~~ 107 are both of a TFT-type. In this case, the scan lines of the sub LCD unit ~~105~~ 107 are short-circuited to the corresponding scan lines of the main LCD unit 105, so that the scan driver circuit 204 of Fig. 2 is omitted. Note that, if the data lines of the sub LCD unit 107 are short-circuited to the corresponding data lines of the main LCD unit ~~104~~ 105, the data driver circuit 203 of Fig. 2 can be omitted.

Amendments to the Claims

1. *(canceled).*

2. (previously presented): An apparatus for driving a plurality of display units in a mobile electronic apparatus, each including a plurality of data lines, a plurality of scan lines and a plurality of pixels each provided at one of said data lines and one of said scan lines, comprising:

at least one of a common data driver circuit and a common scan driver circuit,

said common data driver circuit including a plurality of first switch groups, each first switch group being connected to the data lines of one of said display units for driving the data lines of said one of said display units,

said common scan driver circuit including a plurality of second switch groups, each second switch group being connected to the scan lines of one of said display units for driving the scan lines of said one of said display units,

wherein said common data driver circuit comprises:

a plurality of frame memories for storing video signals, each for one of said display units;

a plurality of third switch groups each group being connected to one of said frame memories and being operated in synchronization with operations of said first switch groups;

a line memory, connected to said third switch groups, for selectively storing one line data of said frame memories in accordance with the operations of said third switch groups;

a gradation voltage generating circuit;

a decoder circuit, connected to said line memory and said gradation voltage generating circuit, for selecting gradation voltages from said gradation voltage generating circuit in accordance with output signals of said line memory; and

an output circuit, connected between said decoder circuit and said first switch groups, for transmitting said selected gradation voltages to said first switch groups, so that said selected gradation voltages are transmitted to the data lines of one of said display units in accordance with the operations of said first switch groups.

3. (original):The apparatus as set forth in claim 2, wherein said gradation voltage generating circuit comprises a plurality of gradation voltage generating units each for one of said display units.

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4. (previously presented): The apparatus as set forth in claim 2, wherein said output circuit comprises:

a plurality of voltage followers, connected to said decoder circuit, for amplifying said selected gradation voltages;

a plurality of first switches each connected to one of said voltage followers; and

a plurality of second switches each connected between an input of one of said voltage followers and an output of one of said first switches,

wherein said first switches are turned ON for a first predetermined time period, and then, said second switches are turned ON while said first switches are turned OFF.

5. (original): The apparatus as set forth in claim 4, wherein said output circuit further comprises a plurality of third switches each connected between the output of one of said first switches and a ground, said third switches being turned ON by a control signal when driving of one of said display units is switched to driving of the other of said display units.

6. *(canceled)*.

7. (previously presented): An apparatus for driving a plurality of display units in a mobile electronic apparatus, each including a plurality of data lines, a plurality of scan lines and a plurality of pixels each provided at one of said data lines and one of said scan lines, comprising:

at least one of a common data driver circuit and a common scan driver circuit,

said common data driver circuit including a plurality of first switch groups, each first switch group being connected to the data lines of one of said display units for driving the data lines of said one of said display units,

said common scan driver circuit including a plurality of second switch groups, each second switch group being connected to the scan lines of one of said display units for driving the scan lines of said one of said display units,

wherein said common data driver circuit comprises:

a shift register circuit for shifting a horizontal start signal in accordance with a horizontal clock signal;

a line memory, connected to said shift register circuit, for storing one line data in accordance with said shift register circuit;

a gradation voltage generating circuit;

a decoder circuit, connected to said line memory and said gradation voltage generating circuit, for selecting gradation voltages from said gradation voltage generating circuit in accordance with output signals of said line memory; and

an output circuit, connected between said decoder circuit and said first switch groups, for transmitting said selected gradation voltages to said first switch groups, so that said selected gradation voltages are transmitted to the data lines of one of said display units in accordance with the operations of said first switch groups,

wherein said gradation voltage generating circuit comprises a plurality of gradation voltage generating units each for one of said display units.

8. (previously presented): An apparatus for driving a plurality of display units in a mobile electronic apparatus, each including a plurality of data lines, a plurality of scan lines and

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a plurality of pixels each provided at one of said data lines and one of said scan lines,
comprising:

at least one of a common data driver circuit and a common scan driver circuit,

said common data driver circuit including a plurality of first switch groups, each first switch group being connected to the data lines of one of said display units for driving the data lines of said one of said display units,

said common scan driver circuit including a plurality of second switch groups, each second switch group being connected to the scan lines of one of said display units for driving the scan lines of said one of said display units,

wherein said common data driver circuit comprises:

a shift register circuit for shifting a horizontal start signal in accordance with a horizontal clock signal;

a line memory, connected to said shift register circuit, for storing one line data in accordance with said shift register circuit;

a gradation voltage generating circuit;

a decoder circuit, connected to said line memory and said gradation voltage generating circuit, for selecting gradation voltages from said gradation voltage generating circuit in accordance with output signals of said line memory; and

an output circuit, connected between said decoder circuit and said first switch groups, for transmitting said selected gradation voltages to said first switch groups, so that said selected

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gradation voltages are transmitted to the data lines of one of said display units in accordance with the operations of said first switch groups,

wherein said output circuit comprises:

a plurality of voltage followers, connected to said decoder circuit, for amplifying said selected gradation voltages;

a plurality of first switches each connected to one of said voltage followers; and

a plurality of second switches each connected between an input of one of said voltage followers and an output of one of said first switches,

wherein said first switches are turned ON for a first predetermined time period, and then, said second switches are turned ON while said first switches are turned OFF.

9. (original): The apparatus as set forth in claim 8, wherein said output circuit further comprises a plurality of third switches each connected between the output of one of said first switches and a ground, said third switches being turned ON by a control signal when driving of one of said display units is switched to driving of the other of said display units.

10. *(canceled)*.

11. *(canceled)*.

12. (currently amended): An apparatus for driving a plurality of display units in a mobile electronic apparatus, each including a plurality of data lines, a plurality of scan lines and a plurality of pixels each provided at one of said data lines and one of said scan lines, comprising:

at least one of a common data driver circuit and a common scan driver circuit,

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said common data driver circuit including a plurality of first switch groups, each first switch group being connected to the data lines of one of said display units for driving the data lines of said one of said display units,

said common scan driver circuit including a plurality of second switch groups, each second switch group being connected to the scan lines of one of said display units for driving the scan lines of said one of said display units; [[+]]

~~further comprising;~~

an oscillator;

a plurality of first frequency dividers, connected to said oscillator, for frequency-dividing an output signal of said oscillator to generate horizontal clock signals;

a fifth switch group connected to said first frequency dividers;

a plurality of second frequency dividers, connected to said oscillator, for frequency-dividing the output signal of said oscillator to generate vertical clock signals;

a sixth switch group connected to said second frequency dividers; and

a frequency control circuit, connected to said fifth and sixth switch groups, for selecting and turning ON one switch of said fifth switch group and one switch of said sixth switch group, so that the data lines of said one of said display units are driven by a selected one of said horizontal clock signals and the scan lines of said one of said display units are driven by a selected one of said vertical clock signals, thus always realizing a definite frame frequency of said one of said display units.

13. (canceled).

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14. (currently amended): An apparatus for driving a plurality of display units in a mobile electronic apparatus, each including a plurality of data lines, a plurality of scan line and a plurality of pixels each provided at one of said data lines and said scan lines, comprising:

_____ a single common data driver circuit including a plurality of first switch groups, each first switch group being connected to the data lines of one of said display units for driving the data lines of said one of said display units; and

_____ a plurality of scan driver circuits, each connected to the scan lines of one of said display units, for driving the scan lines of said one of said display units ~~The apparatus of claim 13,~~

wherein said single common data driver circuit comprises:

a plurality of frame memories for storing video signals, each for one of said display units;

a plurality of third switch groups each group being connected to one of said frame memories and being operated in synchronization with operations of said first switch groups;

a line memory, connected to said third switch groups, for selectively storing one line data of said frame memories in accordance with the operations of said third switch groups;

a gradation voltage generating circuit;

a decoder circuit, connected to said line memory and said gradation voltage generating circuit, for selecting gradation voltages from said gradation voltage generating circuit in accordance with output signals of said line memory; and

an output circuit, connected between said decoder circuit and said first switch groups, for transmitting said selected gradation voltages to said first switch groups, so that said selected

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gradation voltages are transmitted to the data lines of one of said display units in accordance with the operations of said first switch groups.

15. (original): The apparatus as set forth in claim 14, wherein said gradation voltage generating circuit comprises a plurality of gradation voltage generating units each for one of said display units.

16. (original): The apparatus as set forth in claim 14, wherein said output circuit comprises:

a plurality of voltage followers, connected to said decoder circuit, for amplifying said selected gradation voltages;

a plurality of first switches each connected to one of said voltage followers; and

a plurality of second switches each connected between an input of one of said voltage followers and an output of one of said first switches,

wherein said first switches are turned ON for a first predetermined time period, and then, said second switches are turned ON while said first switches are turned OFF.

17. (original): The apparatus as set forth in claim 16, wherein said output circuit further comprises a plurality of third switches each connected between the output of one of said first switches and a ground, said third switches being turned ON by a control signal when driving of one of said display units is switched to driving of the other of said display units.

18 (cancelled)

19. (currently amended): An apparatus for driving a plurality of display units in a mobile electronic apparatus, each including a plurality of data lines, a plurality of scan line and a plurality of pixels each provided at one of said data lines and said scan lines, comprising:

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a single common data driver circuit including a plurality of first switch groups, each first switch group being connected to the data lines of one of said display units for driving the data lines of said one of said display units; and

a plurality of scan driver circuits, each connected to the scan lines of one of said display units, for driving the scan lines of said one of said display units ~~The apparatus as set forth in claim 18,~~

wherein said single common data driver circuit comprises:

a shift register circuit for shifting a horizontal start signal in accordance with a horizontal clock signal;

a line memory, connected to said shift register circuit, for storing one line data in accordance with said shift register circuit;

a gradation voltage generating circuit;

a decoder circuit, connected to said line memory and said gradation voltage generating circuit, for selecting gradation voltages from said gradation voltage generating circuit in accordance with output signals of said line memory; and

an output circuit, connected between said decoder circuit and said first switch groups, for transmitting said selected gradation voltages to said first switch groups, so that said selected gradation voltages are transmitted to the data lines of one of said display units in accordance with operations of said first switch groups,

wherein said gradation voltage generating circuit comprises a plurality of gradation voltage generating units each for one of said display units.

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20. (original): The apparatus as set forth in claim 19 ~~[[18]]~~, wherein said output circuit comprises:

a plurality of voltage followers, connected to said decoder circuit, for amplifying said selected gradation voltages;

a plurality of first switches each connected to one of said voltage followers; and

a plurality of second switches each connected between an input of one of said voltage followers and an output of one of said first switches,

wherein said first switches are turned ON for a first predetermined time period, and then, said second switches are turned ON while said first switches are turned OFF.

21. (withdrawn): The apparatus as set forth in claim 20, wherein said output circuit further comprises a plurality of third switches each connected between the output of one of said first switches and a ground, said third switches being turned ON by a control signal when driving of one of said display units is switched to driving of the other of said display units.

22. (canceled).

23. (currently amended): An apparatus for driving a plurality of display units in a mobile electronic apparatus, each including a plurality of data lines, a plurality of scan line and a plurality of pixels each provided at one of said data lines and said scan lines, comprising:

a single common data driver circuit including a plurality of first switch groups, each first switch group being connected to the data lines of one of said display units for driving the data lines of said one of said display units; and

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a plurality of scan driver circuits, each connected to the scan lines of one of said display units, for driving the scan lines of said one of said display units The apparatus as set forth in claim 13, ;

~~further comprising:~~

an oscillator;

a plurality of first frequency dividers, connected to said oscillator, for frequency-dividing an output signal of said oscillator to generate horizontal clock signals;

a fourth switch group connected to said first frequency dividers;

a plurality of second frequency dividers, connected to said oscillator, for frequency-dividing the output signal of said oscillator to generate vertical clock signals;

a fifth switch group connected to said second frequency dividers; and

a frequency control circuit, connected to said fourth and fifth switch groups, for selecting and turning ON one switch of said fifth switch group and one switch of said fifth switch group, so that the data lines of said one of said display units are driven by a selected one of said horizontal clock signals and the scan lines of said one of said display units are driven by a selected one of said vertical clock signals, thus always realizing a definite frame frequency of said one of said display units.

Claims 24-33. (canceled).

Allowable Subject Matter

2. Claims 2-5, 7-9, 12, 14-17 and 19-21 and 23 are allowable and renumbered as 1-16. The restriction requirement among inventions species 1-2, as set forth in the Office action mailed on 06/14/04, has been reconsidered in view of the allowability of claims to the elected invention pursuant to MPEP § 821.04(a). **The restriction requirement is hereby withdrawn as to any claim that requires all the limitations of an allowable claim.** Claim 24-33 are canceled by Applicant.

Reason for Allowance

3. Claims 2-5, 7-9 and 12 are allowable as indicated in the Previous Office Action and claims 14-17 and 19-21 and 23 are allowable in view of the Interview held on May 17, 2007 for rejoining the claims for Species 2.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

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4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to DUC Q. DINH whose telephone number is (571) 272-7686. The examiner can normally be reached on Mon-Fri from 8:00.AM-4:00.PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, RICHARD HJERPE can be reached on (571)272-7691. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

DUC Q DINH
Examiner
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